



Research Article

STUDIES ON THE PESTS OF THE LAC INSECT HOST PLANT *FLEMINGIA SEMIALATA* AND *FLEMINGIA MACROPHYLLA* IN KERALA

^{1*}S. Muthukumar, ¹T. V. Sajeev, ¹Vandana bharathi, ²A.Mohanasundaram,
³KK Sharma ³K.Thamilarasi, and ³Vaibhav lohot

¹Kerala Forest Research Institute, Peechi, Thrissur, Kerala-680653

²National Research Centre for Banana, Trichy- 620 102, Tamil Nadu

³National Institute of Secondary Agriculture (Formerly India Institute of Natural Resin and Gums and Indian Lac Research Institute), Namkum, Ranchi-834010

Article History: Received 6th January 2023; Accepted 20nd February 2023; Published 26th February 2023

ABSTRACT

The present study attempted to record the insect pests of lac insect host plants in Kerala Forest Research Institute, Peechi, Thrissur. Hand picking and swiping methods were used to collect the insects for identification. From the observation 26 species of pest insects belonging to 4 orders and 19 families were recorded. It was found that all major parts of *Flemingia* were heavily infested but significant damage was caused by the defoliators, mostly heterocera. Out of the 26 insect pests, 15 have been recorded as foliage feeders, 9 as sapsuckers, 1 as pod borer and 1 stem borer. During rearing, 3 species of parasites were found, belonging to three families that were collected and identified. Insects belong to the order Lepidoptera were profoundly seen on *Flemingia*. They cause severe damage to the plant. *Hypena rectivittalis* belonging to the family Noctuidae was found as a major pest and bag worm Psychids was found to be the minor pest. The study reveals that the most serious sapsuckers belong to the order Hemiptera and majority of them are beetles and bugs. During the months of April-May Iceryasp and white flies (*Trialeurodes vaporariorum*) cause heavy damage in *Flemingia*. The study thus concludes that the major pests belong to the order Lepidoptera (42%) followed by order Hemiptera (41%). Most Lepidopterans are defoliators and Hemipterans are sapsuckers.

Keywords: Defoliator, Sapsucker *F.semialata*, Hemiptera, *Flemingia*.

INTRODUCTION

Lac is a resin secretion of insects, which are commercially cultivated through ages. Lac cultivation has its roots in India and Bangladesh, the two main Asian countries in the world and was a major source of economy to the local populace Alkesh (2016). Lac culture plays an important role in conserving bioresources. It is a complex multitrophic web of flora & fauna provides sustained high economic returns, generating employment opportunities & has potential to lead a strong foundation for lac based rural cottage industries Sharma *et al.*, (2006). *Butea monosperma* (Palash), *Schleichera oleosa* (Kusum), and *Ziziphus mauritiana* (Ber) are of major importance in lac cultivation. These host plants contribute about 90% of total national lac production. In India, lac cultivation is

prominent in North and North eastern parts where it contributes a part of annual income of the people living there. In cultivation basis farmers are using plants of *Flemingia* species; *Flemingia semialata* and *Flemingia macrophylla* for hosting lac. Sharma (2017) described about lac insects and host plant reveals the lac ecosystem is a complex multitrophic web of flora and fauna, of the 99 species falling under nine genera recorded from the world.

A pest is an insect or small animal that is harmful or damages crop. Like other plants, lac host plants are also subjected to attack by hoards of insect pests. In order to attain secured and sustained lac production, management of insect pest is essential. To increase the lac production, it is important to manage the insect predators and parasitoids associated with lac host. It has been reported that there are

*Corresponding Author: S.Muthukumar, Kerala Forest Research Institute, Peechi, Thrissur, Kerala-680653, Email: livemuthu@gmail.com

about 19 major and 61 sporadic and minor pests present in important lac host plants. A number of parasites have also been isolated from these pests. Biology of some of the pest and few parasites has been studied but there is no systematic works done for control these pests. Some scattered reports are available to control these pests. In addition to the pests of major tree host plant species a number of insect pest have been recorded from the important bushy host plant. *Flemingia semialata*, not being a plant of commercial importance expects for lac cultivation, Information available on insectpest of *Flemingia* is meagre. A pest complex of about 32 insect pests belonging to six orders and 20 families has been recorded (S.C Meena *et al.*, (2014). Out of these 32 insect-pests, 23 have been recorded as foliage feeders, 7 as sap suckers and one each as pod and root feeders. All the major parts of legume plant viz. pod/seed, leaf, stem and roots were found to be infested. Use of *Flemingia* has only recently started in Kerala. If the occurrence of pest complex in *Flemingia* is very high, it would badly affect lac culture. So the identification of pest in *Flemingia* and their mode of attacks have to take into account for better lac production. *F. semialata* is a most quick growing lac host plant which may introduce on plantation basis even in places lac cultivation on bushy lac host *F. semialata* Ajay Kumar Singh *et al.*, (2015).

MATERIALS AND METHODS

The study was conducted in Kerala Forest Research Institute (KFRI), Peechi, Thrissur lies between 10°31'48"N 76°20'50"E located in 28 hacter Reserve forest areas adjacent to Peechi Vazhani Wild life sanctuary. The institute of KFRI is surrounded by dense vegetation with patches of evergreen trees. The Entomology department of KFRI is growing large number of *Flemingia* plants, the lac host plants, as a part of the project they are running for conservation of lac. The *Flemingia* plants they grown include two species *F. semialata* and *F. macrophylla* which are planted for maintaining lac gene bank. To detect the pest incidence in *Flemingia* planted in KFRI, the plot was monitored regularly from April-May 2017. The observation

was carried out from dawn to dusk at each site. Pests were collected during the field survey using a variety of methods such as hand picking, sweeping and beating, collection with aerial nets. All the plant parts were carefully observed. Population density of each pest was noted by direct count method, damage assessment and intensity of attack were analyzed. Insects including caterpillars collected were transferred in to sterilized bottles and covered by using white cloth to prevent escape of insects. One individual of each species collected was killed using benzene and pinned them in insect collection box for identification and for further studies. Caterpillars collected were reared for the adult. The adult emerged were killed by using benzene and spread using insect pins and preserved in the collection box. Based on the morphological characters including wing pattern, colour and wing span, the adults were identified. Density of pest population if each insect pest was done by direct count method. All the plant parts were keenly observed, counted the number of individuals of each species and recorded.

RESULT AND DISCUSSION

In the present study 26 species of pest insect belonging to 4 orders and 19 families have been recorded. It was found that all major parts of *Flemingia* were heavily infested but heavy damage is caused by the defoliators mostly heterocerases out of 26 insect pest 15 have been recorded as foliage feeders (Figure.1), 9 as sapsuckers (Figure.2) and 1 as pod borer and 1 stem borers. During rearing 3 species of parasites were found, belonging to three families were collected and identified. Major pests and parasites are listed below. The major pests belong to the order Lepidoptera (42%) followed by order Hemiptera (41%) and it presented in the graph number (Figure 3). The Most Lepidopterans are defoliators and Hemipterans are sapsuckers. Major pests of *Flemingia* include defoliators, sap suckers, stem borers, pod borers, and root feeders. Most of them are foliage feeders, they scrap the leaves resulting in small holes, and later on it starts feeding. *Hypena rectivittalis* (Moore), *Spodoptera litura* Fabricus, *Amsacta lactinea* Cramer, *Dasychira mentosa* Hubner have been reported as the major defoliators of *F. semialata* (Meena *et al.*, 2014).

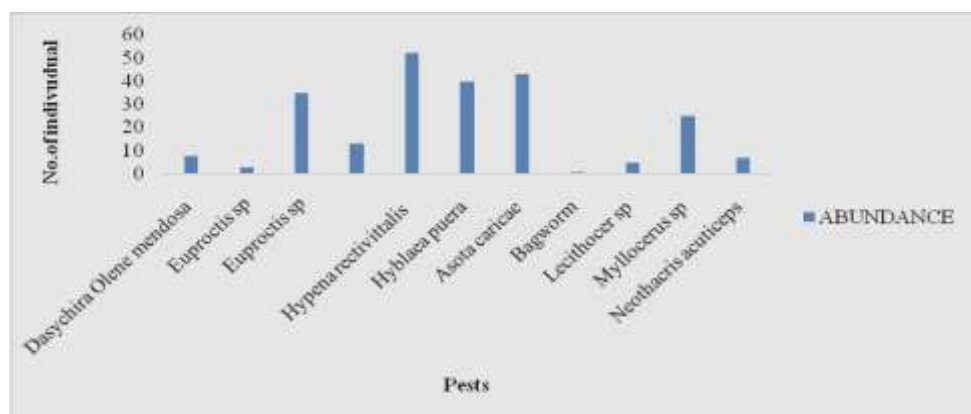


Figure 1. Abundance of lac insect host plant defoliator pests on *F. semialata* at Kerala forest research institute, Kerala.

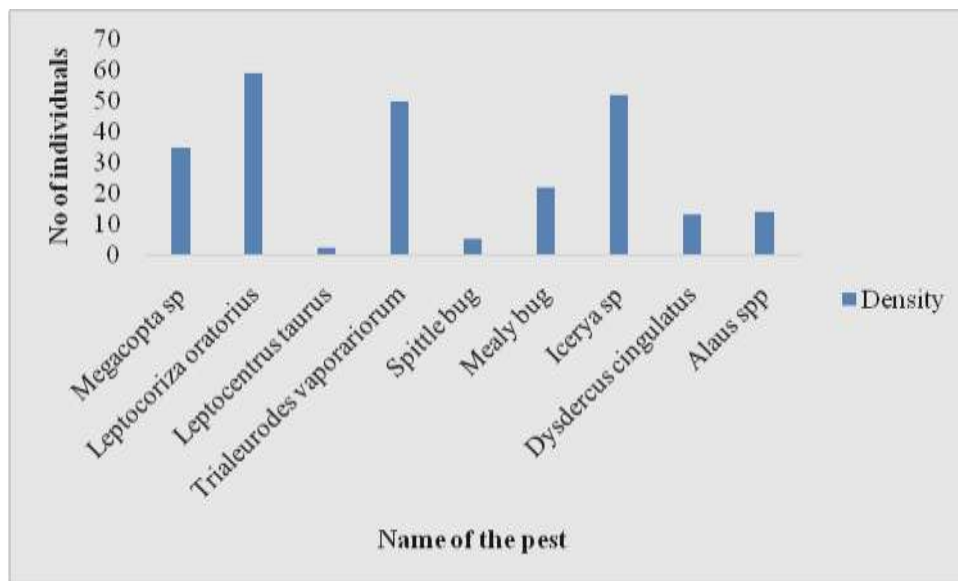


Figure 2. Population density of sap suckers on *F.semialata* pest at genebank of Kerala forest research institute, Peechi.

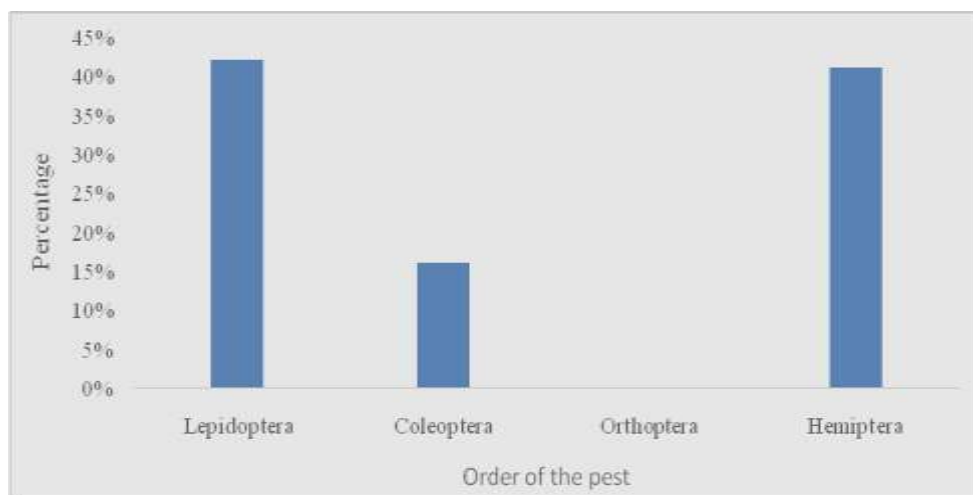


Figure 3. Abundance of the pest on *F.semialata* at lac insect host plant genebank of Kerala forest research institute, Peechi, Kerala.

Earlier reported pests include *Lawana conspersa* (Mohanasundaram *et al*, 2012) which is a sap sucker. Other sap suckers include stink bug, rice ear head bugs, mealy bugs, spittle bugs, cow bugs, aphids etc. These bugs congregate on the plant in large number, pierce and suck the cell sap from various parts, underneath of leaves, tender parts of stem and sometimes cause the curling, yellowing,

dropping and distortion of leaf and stunted growth. Although there are many host plants for lac insect Flemingia, is one of the plant recently used for commercial lac cultivation. Use of this plant has only recently started in Kerala. Normally for a new plant, the pest incidence should be low, but contrary to this Flemingia infested by numerous pest species which have easily adapted to the plant. So

documentation of pest is inevitable for sustainable lac production. My studies on the pest of lac insect host plants *Flemingia semialata* and *Flemingia macrophylla* in Kerala focused for the identification and population estimation of the insect pests.

Meena *et al.*, (2012) reported that *Icerya aegyptiaca* Douglas: a new pest of *F. semialata* and as an alternate host of *Aprostocetus purpureus* (Cameron) in lac ecosystem reveals that *Icerya aegyptiaca* Douglas is tiny scales covered with white mealy wax coatings were observed on *F. macrophylla*. The causal pest was identified as *I. aegyptiaca* based on morphological and host damage observations. The parasitoid *Aprostocetus purpureus* was also observed emerging from parasitized *I. aegyptiaca* adults. This is thought to be the first report of *I. aegyptiaca* infesting *F. macrophylla* in India and also as an alternative host of *A. purpureus*.

CONCLUSION

Plants and insects have coexisted for at least 100 million years and have evolved a variety of beneficial and deleterious interactions. The population estimation of insect population in *Flemingia* reveals that the Lac host plant *Flemingia* is widely attacked by insects belonging to the orders Lepidoptera, Hemiptera, Coleoptera, and Orthoptera. It will affect the production of Lac. These insects are common to other host plants such as Tea, teak, cotton, etc. However, applying biological pesticides such as neem oil can control a few insect populations. Even though it is not an effective method to tackle this problem. The shift from chemical control and recent innovations in biotechnology production and the use of biological insect control agents is the challenge has been due to environmental concerns. This study reveals that to control insect populations a deep study was essential.

ACKNOWLEDGEMENT

The authors are thankful to the NP-CLIGR, NISA, Ranchi and Dean, for providing the financial support and necessary facilities. Title of the project "Network Project on Conservation of Lac Insect Genetic Resources" funded by ICAR, New Delhi.

REFERENCES

- Ajay kumar S. and, Raj Yogi., K (2015). Lac cultivation on bushy host plant *Flemingia semialata*), ICAR-Indian Institute of Natural Resins and Gums Namkum, Ranchi.
- Alkesh I Shah, (2016). Importance of lac culture on socio economic and biodiversity conservation fronts, B.P.Baria science Institute, Navsari,Gujarat.
- Meena, S. C.,Sharma, K. K.,Mohanasundram, Swetha, A., Verma , Monobrullah, M.D., (2014). Insect-pest complex of *Flemingia semialata* roxb-A bushy host for lac cultivation.
- Meena, S., Sharma.K., Mohanasundaram A., and Monobrullah, M (2012). *Icerya aegyptiaca* Douglas: a new pest of *Flemingia semialata* and as an alternate host of *Aprostocetus urpureus* (Cameron) in lac ecosystem. *Indian Journal of Entomology*. 74. 404-405.
- Mohanasundaram, A., Sharma, K. K., and Meena, S. C., (2012). New record of *Lawana conspersa* (Walker) (Homoptera; Flatidae) as a pest of lac host plants, *Indian Journal Entomology*, 74(4), 399-401.
- Sharma, Kewal. (2017). *Lac Insects and Host Plants*. 10.1007/978-981-10-3304-96.